Research Reports

Cryptozoology, 7, 1988, 61–65
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A MATHEMATICAL ANALYSIS OF "SNOWMAN" (WILDMAN) EYEWITNESS REPORTS

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ABSTRACT: Eyewitness reports from people who claimed to have observed a Snowman (wildman), collected by a commission of the Academy of Sciences of the U.S.S.R. in 1957–58 and from expeditions in 1984–86, were analyzed by applied mathematical techniques. The methods of biological statistics, phenetics, and criminalistics (theory of testimonies) were used. The following traits are apparent: tall stature mode (2.04 m), and short stature mode (1.56 m); four variants of color: yellow-brown, brown, grey, and black. As a whole, the reports are consistent, and no hoaxing is detectable. The data concur with modern ideas concerning the population genetics of rare mammals on the verge of extinction. Verifying the reality of the Snowman will require additional research.

INTRODUCTION

Our main source of information on the Snowman[1] is in the form of eyewitness reports. Let us consider whether such information is authentic. Snowman reports were summarized by a commission of the Academy of Sciences of the U.S.S.R. (1957, 1958). Subsequently, the commission ceased to function. Some modern scientific techniques were not known at the time, and much progress in the field of statistics has taken place in recent decades.

For example, criminalistics has developed a mathematical theory of testimonies. Another new technique is phenetics, genetic analysis based on external discrete traits, initiated by Yablokov (1980).

After extracting maximal reliable information from all the available reports on chance Snowman observations, two alternative hypotheses present themselves:

[1] The term "Snowman" is used in the Soviet Union to refer to the reported Soviet hominid or hominoid, not necessarily the Himalayan Yeti.—Editor.

1. The Snowman represents a real, biological species.
2. All Snowman information is based on misidentifications and hoaxes.

If the first hypothesis is correct, the reported descriptions should concur with concepts of modern ecology and genetics concerning species whose population is becoming extinct. If the second hypothesis is correct, Snowman reports should be removed from the realm of modern biology. In arriving at the correct hypothesis, we should note the improbability of there being a large number of independent, mendacious (or misguided) people having competence in modern biology.

Method

The following information was used:

1. Reports compiled by the Snowman Commission of the Academy of Sciences of the U.S.S.R. in 1957-58.
2. Information collected during 1984–85 in the Tien Shan mountains by an expedition of the Vertical Alpine Club, Volgograd, and specialists from Leningrad, Moscow, and the Aksu-Dzabagly Reserve, near the city of Chimkent. The author participated in this expedition. Materials other than eyewitness accounts—i.e., photography and footprint tracks—are not considered in this paper.

Only the most credible reports, involving 200 Snowman sightings, were analyzed. The following characteristics were recorded: color, height, and sex. The following statistics were used: the range of distribution of quantitative traits, mean (x), standard deviation (σ), and the coefficient of intrapopulation variability (Zhivotovsky 1980). The significance of differences between means were checked by methods of Student (t) and of Fisher (F).

The mathematical theory of testimonies was developed mainly on data from traffic incidents (Rossinsky 1984). According to the theory, the distribution of quantitative characters of observed items within a group of witnesses must be normal or Gaussian. Subjective biases on the part of witnesses tend to displace the mode of distribution. The qualifications or educational backgrounds of witnesses influence the variance of distribution: the higher the qualifications or education, the less is the variance of distribution.

Results

Let us examine the data on the height of the reported Snowman. The mean is 191 $\pm$ 3 cm, σ = 30 cm. For comparison, the average height of modern *Homo sapiens* is 166 $\pm$ 0.4 cm, σ = 5.7 cm (students at Leningrad State University were used without taking sexual dimorphism into account). Hence, the reported Snowman is taller and more variable in stature than is usual for humans. The great variability could be due to: (a) an unreliable method of measurement (human perception); or (b) greater variability in

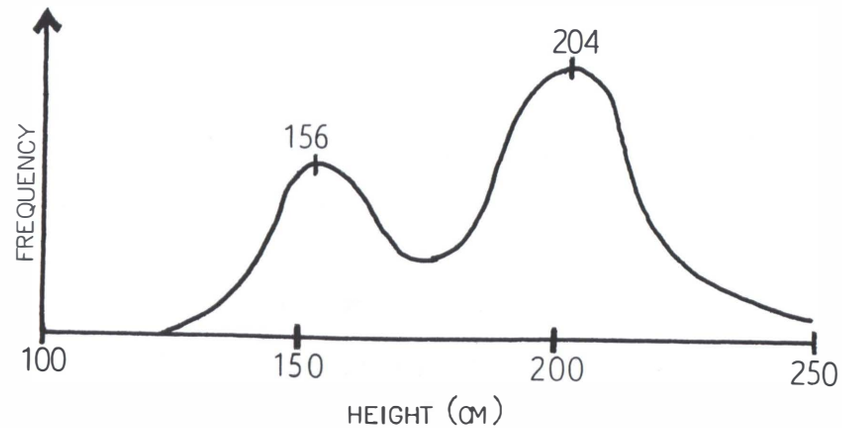

FIG. 1.—Distribution of Snowman stature in eyewitness reports.

actual size, which is typical for species under conditions of stress or population decline (Sapunov 1984).

The height distribution appears to be Gauss bimodal (Fig. 1). The first mode is 204 cm, σ = 24 cm, error = 3 cm. The second mode is 156 cm, σ = 15 cm, error = 3 cm. The difference between the two modes is significant. There are two possible sources of such a difference:

1. Sexual dimorphism, males in most primate species being larger than females.
2. Racial dimorphism.

The second is more likely because some witnesses reported seeing a very tall female Snowman.

What about the validity of such reports? The possibility of hoaxing for personal notoriety, or to call attention to the problem of the Snowman, certainly exists. However, different people have different *a priori* information on the problem. Highly educated people obtain much of their information from the scientific literature, while persons with lower levels of education use other, more popular sources of information. Hence, levels of education can influence the character of such reports. The existence of specific differences in descriptions by persons of different educational levels may indicate whether such reports are hoaxed or authentic.

To test this, I divided all the witnesses into two groups. The first group consisted of people with advanced formal education; the second group consisted of people with little formal education. The distributions of the heights of the reported Snowman in both groups were analyzed separately. In both groups, the distribution was bimodal. The means and variances are listed in Table 1. Significant differences between the two sets of data are absent.

TABLE 1—Dependence of Snowman height reports on educational level of witnesses.

Trait	Witnesses	
	Highly educated	Not highly educated
Height	196 cm	190 cm
Error	5 cm	3 cm
σ	0.24	0.37

This suggests that the Snowman reports from both groups are based on objective reality.

According to the theory of testimonies, the extremes of the quantitative traits reported by a group of independent witnesses should be distributed in the tail or tails of a normal or Gaussian distribution if the data are authentic (Rossinsky 1984). False reports would be distributed with many peaks, and without tails. The existence of one or two modes suggests a single direction of hoaxing—which is unlikely—or the objective reality of the reports.

Let us consider the data on the reported colors of the Snowman. The qualitative characters within populations is the field of phenetics (Yablokov 1980). I attempted to follow the main phenes of color. Age polymorphism (e.g., white hairs) was not considered.

There are four colors (phenes) with the following frequencies: brown = 0.63, gray = 0.23, yellow-brown = 0.09, and black = 0.05. The intrapopulation coefficient of variability (Zhivotovsky 1980) is $M = (\Sigma \sqrt{pi})^2 = 3.2 \pm 0.06$. Such a mean is usual for zoological species, and it also suggests that the population is suffering destabilization. The same pattern of colors may be seen in other primates.

The genetics of color and pigments of mammals is well known (Montagna and Ellis 1958). Data in the literature may be used to interpret possible Snowman genetics. Mammal hair color depends on two pigments. They are melanin (black) and eumelanin (yellow-brown). The resulting color depends on the ratio between the two pigments, on their pattern, and on the production of the pigment cells (melanocytes).

We will now consider some genes with their usual nomenclature. Gene B influences the structure of the pigment matrix of melanosomes within melanocytes. The dominant allele B produces black, the recessive one, b, produces brown. Gene D influences the strength of pigment. The dominant allele insures strong, intensive color (e.g., black or brown), the recessive one, d, leads to dilution of color to gray or yellow. Gene E influences the number of eumelanin granules in the hairs. Dominant allele E leads to production of black, recessive e to yellow. These genes are not linked. The gene combinations may produce a large number of color variants, including the four variants listed above in the Snowman phenotypes.

Let us assume the frequency of alleles D and d, as well as E and e, are equal, while the frequency of allele b is more than that of allele B. Under these conditions, the expected pattern of colors may be close to what is reported. Because of limited data, it is of little value to consider the correct computing model of the genetic structure of the population. The main conclusion here is that the descriptions given in eyewitness reports appear to be authentic from the perspective of population biology.

The next question deals with sex ratio. Witnesses sometimes identified Snowman sex by secondary sexual traits. Analysis of the data indicates that the percent of reported males is 56 ± 3. This is close to the usual relation of 1 to 1. A little oversupply of males is typical for a population in extreme conditions. Such situations are well known in human populations (Beckerman 1976).

DISCUSSION

The question of the existence of the Snowman is still unresolved at the present time. However, based on the analysis of existing eyewitness reports, we may conclude the following: (a) the numerous reported Snowman observations are not contradictory; the reports are consistent, and hoaxing is not statistically detectable; (b) the descriptions given appear to be in accord with modern concepts of ecology, population biology, and primatology; and (c) the definitive answer to the question of the existence of the Snowman may be determined by future research.

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